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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 01231.0002P1	FOR FURTHER ACTION		See item 4 below
International application No. PCT/US2005/002317	International filing date (day/month/year) 24 January 2005 (24.01.2005)	Priority date (day/month/year) 23 January 2004 (23.01.2004)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant ARIZONA BOARD OF REGENTS FOR AND ON BEHALF OF ARIZONA STATE UNIVERSITY			

1.	This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).		
2.	This REPORT consists of a total of 6 sheets, including this cover sheet. In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.		
3.	This report contains indications relating to the following items:		
	<input checked="" type="checkbox"/> Box No. I	Basis of the report	
	<input type="checkbox"/> Box No. II	Priority	
	<input checked="" type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	
	<input checked="" type="checkbox"/> Box No. IV	Lack of unity of invention	
	<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	
	<input type="checkbox"/> Box No. VI	Certain documents cited	
	<input type="checkbox"/> Box No. VII	Certain defects in the international application	
	<input type="checkbox"/> Box No. VIII	Certain observations on the international application	
4.	The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).		

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Date of issuance of this report 28 December 2006 (28.12.2006)
	Authorized officer Simin Baharlou e-mail: pt09@wipo.int

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
CHRISTOPHER L. CURFMAN
NEEDLE & ROSENBERG, P.C.
SUITE 1000
999 PEACHTREE STREET
ATLANTA, GA 30309-3915

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference 01231.0002P1		Date of mailing (day/month/year) 25 OCT 2006
		FOR FURTHER ACTION See paragraph 2 below
International application No. PCT/US05/02317	International filing date (day/month/year) 24 January 2005 (24.01.2005)	Priority date (day/month/year) 23 January 2004 (23.01.2004)
International Patent Classification (IPC) or both national classification and IPC IPC(8): A61K 9/14(2006.01);G03C 1/73(2006.01) USPC: 424/487;430/345		
Applicant ARIZONA BOARD OF REGENTS FOR AND ON BEHALF OF ARIZ		

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Date of completion of this opinion 13 September 2006 (13.09.2006)	Authorized officer Richard Schmitzer, Ph. D. Telephone No. 571-272-0500
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Form PCT/ISA/237 (cover sheet) (April 2005)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US05/02317

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
- ☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper
- ☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
- ☐ filed together with the international application in electronic form.
- ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US05/02317

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 9-11 and 23-35

because:

☐ the said international application, or the said claim Nos. _____ relate to the following subject matter which does not require an international search (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 9-11 and 23-35 are so unclear that no meaningful opinion could be formed (*specify*):

Claims 9-11 depend from claim 7 and recite variables such as X, R2, and R1 which have no antecedent basis in claim 7 and are not defined by claims 9-11. Claims 23-35 are improper multiple dependent claims.

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):

☐ no international search report has been established for said claims Nos. _____

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13ter.1(a) or (b).

☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-bis of the Administrative Instructions, and such tables were not available to the International Searching Authority in a form and manner acceptable to it.

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.

☐ See Supplemental Box for further details.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US05/02317

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
- ☐ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☒ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
See the lack of unity section of the International Search Report (Form PCT/ISA/210)

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-8 and 14-22

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US05/02317

Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>8, 18, 22</u>	YES
	Claims <u>1-7, 14-17, 19-21</u>	NO
Inventive step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-8, 14-22</u>	NO
Industrial applicability (IA)	Claims <u>1-8, 14-22</u>	YES
	Claims <u>NONE</u>	NO

2. Citations and explanations:

Claims 1-7, 14-17 and 19-21 lack novelty under PCT Article 33(2) as being anticipated by Asher et al (US 6589452).

Asher taught hydrogels of acrylamide, or substituted acrylamides, comprising spiropyran and crosslinked with N,N' methylenebisacrylamide, thus anticipating the claims. Note that alkenyl groups are inherent in spiropyran, and are responsible for their photoactivity.

Claims 1, 7, 19, and 20 lack novelty under PCT Article 33(2) as being anticipated by DISSABS Accession No. 2004:43652 (Donnelly).

Donnelly taught hydrogels for drug delivery in which a spiropyran was polymerized with hydroxyethylmethacrylamide, thus anticipating the claims.

Claim 8 lacks an inventive step under PCT Article 33(3) as being obvious over either one of Asher et al (US 6589452), or DISSABS Accession No. 2004:43652 (Donnelly).

These references taught compositions comprising hydrogels comprising spiropyran, but did not specifically teach the structures set forth in claim 8. However, the description discloses at page 24, that these spiropyran were known in the art. In the absence of any unexpected results conferred by the specific genus of spiropyran claimed, they would have been obvious over the genus of spiropyran taught by the cited art.

Claim 18 lacks an inventive step under PCT Article 33(3) as being obvious over DISSABS Accession No. 2004:43652 (Donnelly) in view of Rolland (US 6040295).

Donnelly taught hydrogels for drug delivery in which a spiropyran was polymerized with hydroxyethylmethacrylamide.

Donnelly did not teach a hydroxypropylcellulose hydrogel.

Rolland taught a variety of hydrogels for drug delivery, and indicated that hydroxyethylmethacrylamide and hydroxypropylcellulose hydrogels were exchangeable alternatives. See column 6, lines 10-19. As such it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute hydroxypropylcellulose for hydroxyethylmethacrylamide in the method of Donnelly.